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Public Health Reports

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PREVALENCE OF POLIOMYELITIS

For the week ended June 17, 1939, 65 cases of poliomyelitis were reported for the entire United States. While this represented a slight increase over the preceding week, the number remained below the 5-year median of 69 cases.

In comparing the incidence in South Carolina with that of earlier weeks, there appears to be little or no change so far as the State as a whole is concerned. Reports by counties are not available at this time, but judging from conditions obtaining in earlier weeks, it is likely that the disease is appearing in some new localities and declining in others, which changes have kept the total on a fairly even level or varying only slightly. For the current week 28 cases were reported from the entire State, as compared with 27 cases for the preceding week and 28 cases for the week ended May 20—the highest numbers of weekly cases for the year to date.

While the future incidence of poliomyelitis cannot be predicted, this is the time of year when some normal seasonal increase in the disease may be expected; and while some States may show some increase in prevalence, others report no cases or decreased incidence. During the 7-week period from April 30 to June 17, reports were received from all States; only 3 States reported cases for each week during that period, and only 6 States reported more than 3 cases for any one week. For the same period, 14 States reported no cases and 17 States which had reported one or more cases during the period reported no cases for the week ended June 17.

WHY SMALLPOX?

According to reports received by the United States Public Health Service, the United States led all other nations of the world, except India, in the number of smallpox cases reported in 1937. In that year 11,673 cases occurred in this country, while in 1938 the disease prevailed to an even greater extent than it had in the preceding 5 years, and the number of cases increased to approximately 15,000. In 1936, according to reports of the Health Organization of the League of

Nations, England and Wales, with a population of 40,839,000, reported only 12 cases; France, with 41,906,000 population, reported 273 cases; and Germany, with a population of 67,346,000, reported no cases.

Where and why is smallpox occurring in the United States? The answer to the first part of this question is given in the accompanying table, which shows the geographic areas in which the anomaly of smallpox prevalence still constitutes a challenge to health officers and enlightened public opinion.

Some States have had no cases of smallpox for several years. An interesting comparison was presented recently [1] in which it was stated that New Jersey, with a population of about 4,400,000, has not had a case for more than 7 years, while the States of North Dakota, South Dakota, Montana, Idaho, Oregon, Wyoming, and Utah, with a combined population less than that of New Jersey, reported during the same period a total of more than 12,000 cases.

Smallpox in the United States in 1938, by geographical areas

Area	Number of cases	Population [1]	Cases per 100,000 population
New England	0	8, 620, 000	0
Middle Atlantic	0	27, 580, 000	0
South Atlantic	100	17, 464, 000	. 6
East South Central	847	10, 851, 000	7. 8
West South Central	1, 506	13, 021, 000	11. 6
East North Central	3, 376	25, 995, 000	13. 0
Pacific	2, 883	8, 967, 000	32. 2
West North Central	4, 763	13, 890, 000	34. 3
Mountain	1, 469	3, 826, 000	38. 4

[1] Estimated.

The answer to the question why we continue to have smallpox is found in the three words—failure to vaccinate. One of the explanations—not excuse—for this state of affairs is probably the comparative mildness of the disease in recent years and the reduction of incidence as compared with that of 15 or 20 years ago. Except in outbreaks of virulent type, relatively few persons now die of smallpox as compared with earlier years; and although authorities differ in opinion regarding the possibility of the malignant type developing spontaneously from the milder disease, past experience demonstrates that this possibility must be considered. In addition, there is always the danger that the malignant form may be introduced from outside our boundaries. In either instance the building up of a large group of nonimmune persons by the neglect of vaccination presents an exceedingly serious situation. While it is to be hoped that a virulent type of smallpox will not again appear, we cannot rely on hope; for it must be remembered that the disease has, in the past, assumed epidemic proportions and virulent form, as it did in Denver in 1921

[1] Statistical Bulletin, May 1939. Metropolitan Life Insurance Co.

and 1922, when 1,718 cases, with 285 deaths, were reported, and in Minneapolis in 1924, when 993 cases occurred, with 221 deaths.

The experience of a Western State may be cited as a timely warning. Some years ago this State specifically prohibited compulsory vaccination. During the first 20 years following the passage of this law, approximately 3,000 cases were reported annually. This did not occasion any great worry or alarm, because the prevailing type of the disease was mild and few deaths were recorded. In the next year, however, malignant smallpox was introduced into the State, where there had grown up an unvaccinated population of susceptibles. Within 20 months 4,041 cases of the malignant disease occurred, taking over 500 lives. It is reported that only 72 of these cases occurred among persons vaccinated within the preceding 7 years and only 1 of these cases proved fatal. Of the other 3,969 cases about 88 percent had never been successfully vaccinated.

The continued and increasing prevalence of smallpox, and the recent outbreak in an eastern State, in which the disease was believed to have been introduced by a nonresident traveler, should stimulate health officers and citizens with inquiring minds and concern for the public health to consider and apply the one specific preventive measure that will control the disease—vaccination. No other disease of mankind is so easily controlled. The efficacy of vaccination needs no further demonstration, and with modern methods this simple prophylactic procedure causes little or no discomfort. The cost is so small as to make it readily available and within the means of everyone. With a proper regard for, and the application of, this effective means of prevention, there is no doubt that smallpox can be eliminated from every section of the country.

THE VALUE OF COOPERATION IN THE DERATIZATION OF SHIPS

By Grover O. Sherrard, *Acting Assistant Surgeon, United States Public Health Service, Chief, Ship Sanitation Division, United States Quarantine Station, Rosebank, Staten Island, N. Y.*

The following report on the deratization of the Dutch steamship *Yselhaven* is believed to be of particular interest in showing what can be accomplished in reducing the rat population on ships through the cooperation of quarantine personnel with shipping interests and by both working together toward the accomplishment of a common objective.

The vessel arrived at Boston on March 9, 1939, with a cargo of ore and cement from northern European ports, was given provisional pratique in quarantine and inspected for rat infestation, with the result that 20 rats were estimated. Trapping was advised and the

vessel was remanded with residue cargo to Bridgeport, Conn., for further quarantine treatment. At that place it was inspected, during discharge of local cargo, by a sanitary inspector from the New York quarantine station, who estimated a minimum of 25 rats. Recommendations were made to the master for the trapping of rats and the cleaning of the vessel, with detailed instructions as to places and methods. The responsible shore agents were communicated with by phone from the New York quarantine office and arrangements were made for them to authorize the purchase of additional traps at the next port of call, which was Baltimore, Md. Through the cooperation of the agents and the master of the vessel, clean-up operations were started and the few available traps were baited and set.

The vessel was re-remanded to Baltimore, with residue cargo, at which port it arrived on March 19, 1939, three rats having been trapped en route. The vessel was again inspected and 20 rats were estimated. The master secured the additional 60 traps previously arranged for and received further instructions and supervision from the Baltimore quarantine station. From Baltimore the vessel was re-remanded to New Orleans with residue cargo, but apparently received a change of orders en route and proceeded to Galveston, Tex., at which port it arrived on March 28, 1939, 40 rats having been trapped en route. At this port the vessel was again inspected, 12 rats were estimated, and the master was instructed to continue trapping. The vessel was released from further quarantine restrictions at Galveston, loaded a cargo of wheat, and sailed for Hull, England, arriving about May 1, 1939, an additional 10 rats being trapped en route. At Hull the vessel was inspected by a representative of the port health authority and a deratization exemption certificate was issued stating that there were no rats on board. After loading cargo the vessel sailed for New York, arriving May 23, 1939, and was inspected before and after discharge of cargo with the result that evidence was found suggesting the presence of 2 rats.

During a period of approximately 56 days, 53 rats were caught on this vessel and the sanitary status was changed from that of a vessel with marked rat infestation to one of slight or no infestation.

While this case is somewhat spectacular as regards the speed and efficiency with which the method applied reduced the rat population, it is by no means a single occurrence. Gratifying results are frequently secured, and the results obtained on this vessel demonstrate what may be accomplished toward the reduction of the rat population on a vessel when there is full cooperation by all concerned. In this instance the deratization procedure inaugurated at Boston and New York was made effective only because of the complete cooperation on the part of the agents and ship's crew and the efficient supervision of the Baltimore and Galveston quarantine stations.

THE SIGNIFICANCE OF DUST COUNTS [1]

By J. M. DallaValle, *Passed Assistant Sanitary Engineer, United States Public Health Service*

Much of the confusion arising from the interpretation of dust counts may be traced to the lack of appreciation regarding their actual significance. Many investigators have neglected the limitations of the technique used and this failure has caused much serious criticism as to the value of counts in evaluating a dusty environment. This has been especially true when attempts were made to comprehend the meaning of wide variations in results so often obtained. One is led to inquire, therefore, what the criteria are which make dust counting definitely valuable.

Dust counts have a threefold application: (1) They are an index of the cleanliness of a plant; (2) they help to determine the effectiveness of dust-removal equipment; and (3) they can be used in conjunction with medical data to determine the threshold or safe limit of exposure to a specific dust. In practice, the first and second applications are more often used than the third. It is of importance to check upon the performance of control measures in order to protect workers from excessive dust exposures. Dust counts are a quantitative measure of environment, which, coupled with a knowledge of the safe or threshold limit, tell whether the conditions found are inimical to the health of workers. The third application of dust counts, namely, their use in establishing threshold limits, is a research function. In order to understand the causes of the difficulties encountered by so many investigators in making dust counts, there will be discussed briefly in this paper the characteristics of instruments and techniques generally used for dust sampling, the environmental conditions affecting the sample, and the methods of averaging and weighting of counts in order to arrive at an index of dustiness which accurately defines the environment of the worker. These factors have a direct bearing on the applications of dust counts mentioned above.

METHODS OF SAMPLING

There are two general types of sampling, which may be designated as continuous or integrating and grab or instantaneous. The first is represented by the impinger device as used by the Public Health Service (*1*). This instrument samples at a constant rate for any period of time and thus "interprets" variations in dust concentration. The second mode of sampling includes devices similar to the Owens jet dust sampler and the Kotze konimeter, which take small and relatively instantaneous samples. Both methods of sampling are valuable and are widely used. As with all instruments, they have

[1] From the Division of Industrial Hygiene, National Institute of Health.

certain applications for which they are best fitted. These must be appreciated if the results obtained are to be reliab e indices of the environment.

There is no need for absolute sampling devices, that is, any equipment that will capture *all* dust suspended in the air. It will be shown in the course of this discussion that such a device would be of little value. All that is required of any method is that it secure a representative sample of dust present in the air, and that it be possible for tests to be duplicated by other investigators.

An exaggerated feeling exists among many technicians making dust surveys for a "simple" dust-counting instrument. Generally, it is desired to make daily or weekly inspections. What is actually wanted is a rapid method of making dust counts. While it is admittedly useful to have an instrument that is both rapid and reliable, it must be stressed that frequent dust surveys are not necessary. The pneumoconioses develop only after many years of exposure to dust. Consequently, two, or at most three, surveys annually are all that are required to evaluate exposure in any dusty trade. Control equipment once tested to assure effective removal of dust will continue to perform so long as it is maintained in good condition. Finally, in making repeated checks of a given activity, it is important to have designated sampling points accurately spotted, since dust concentrations vary considerably with distance from the source of production.

THE GREENBURG-SMITH IMPINGER

The Greenburg-Smith impinger is the most common device used for dust sampling in this country. Its advantages over other instruments have been discussed at length and need but little mention here (*1*). The impinger is adapted to taking samples of air-borne dust over short or long periods of time. It is not efficient for very small particles (less than 0.5 micron), but the fact that samples can be duplicated, plus its reliability, are distinct advantages. The lack of efficiency of the impinger device for small particles need cause no alarm, because it is doubtful whether very small particles ($<$0.5 micron) are sufficiently injurious to warrant an accurate estimation of them (*2*). The use of darkfield methods adds little to the reliability of the count, since, as has been mentioned, the impinger itself has a vanishing efficiency as the size of the particles sampled diminishes.

Volume of sample.—There are several points of view as to the amount or volume of impinger sample which should be taken. Many believe that numerous short-time samples have greater significance than a few long-time samples. There can be no question but that a large number of samples taken at various times depict better the environment than single samples, even if taken over a period of several hours. The reason for this is not far to seek. No activity

produces a constant quantity of dust. The human element, as well as variations in dust-producing processes, change from day to day. Samples taken for too long a time are subject to two serious criticisms: (1) Long-time samples cause many particles to go into solution, and (2) if a process tends to produce dust floods, there is a tendency to overlook important causes of dust production. Moreover, long-time samples lead to results which do not correctly picture the dust generated by the activity itself. This phase of the dust-sampling problem will be discussed more fully in another section. The Public Health Service has relied on short-time samples in great numbers. For low dust concentrations, from 5- to 10-cubic foot samples are taken, while for higher concentrations the time of sampling may be reduced to as low as one minute.

Dilution of sample.—The dilution of concentrated samples may lead to large errors in counting. Concentrated samples flocculate and settle at higher rates than dilute samples. Consequently, the portions transferred by pipette are not always representative. However, this in itself may not be a serious drawback except when the samples are taken for long periods of time. The dilution of samples should proceed to a point where the average count per one-fourth field is greater than 20 and less than 40 particles. Control samples may be relatively free from particles, but as a rule they average from 4 to 10 per one-fourth field. If, therefore, the count is much less than 20 per one-fourth field, it is probable that some fields may be constituted almost entirely of dust contained in the control sample itself.

Microscopy.—Mention has already been made of the limitations of the microscopic system used for counting impinger dust samples. In addition to what has been said, it may be stated that accuracy in counting depends to a great extent on experience. The technician skilled in recognizing dust particles employs just enough illumination so that all particles stand out distinctly. Less experienced technicians frequently use too much illumination which may often obscure highly refractive particles as well as tire the eye. The application of color adapters to the illumination system on microscopes often helps in making certain particles, such as quartz, stand out with clearness.

GRAB SAMPLE DEVICES

The chief criticism of grab sample devices may be said to be the smallness of the sample taken and the lack of any reliable data as to the significance of the results obtained. These devices should not be compared with continuous sampling devices such as the impinger. There are no points of similarity to warrant comparisons. The impinger device integrates the dust sampled over a period of time, while the grab sampler represents conditions existing during a brief instant. The devices are to be compared only when the dust con-

centration is known to be constant. Even then care should be exercised, since the selectivity and other characteristics of the instruments may vary with dust concentration.

Field of application.—It must not be concluded from the foregoing that grab samplers are not to be used. For general air samples and for routine control work these devices are quite effective. Similarly, repeated samples taken at a station may often reveal the variations in dust concentration with time. Such studies help to locate sources or activities producing excessive amounts of dust. It is in the field of dust control that grab sample devices find their most valuable application. Once a criterion or threshold limit has been decided upon for the device selected, it is necessary merely to determine from time to time whether this criterion is being met. Hatch (*3*) has discussed a novel arrangement with one form of grab sampling device which is both rapid and simple to use. In the hands of a trained technician and used at fixed sampling stations, routine surveys of dust conditions in a plant can be expedited, and all failures in control equipment noted and remedied. Exact quantification is not necessary; only a visual comparison of the sample taken with the standard is required.

EFFECT OF ENVIRONMENTAL CONDITIONS ON DUST COUNTS

The conditions giving rise to a dusty atmosphere are the all-important considerations limiting the quantitative aspects of dust-counting methods. No greater accuracy is needed in sampling than the nature of the dust-producing activities warrants. Dust counts will average either high or low depending on whether large or small quantities of dust are produced by the activity in question. This will be the case regardless of refinements of technique in sampling.

No dust sampling should be undertaken until a careful study of the occupations and activities involved in producing dust is first made. Dust samples should never be taken to represent the exposure of a group of activities alone, since such samples do not indicate the relative amounts of dust to which all the workers are exposed. In its many field investigations, the United States Public Health Service has generally given its attention to the determination of the exposure of specific occupational groups. This has been done because similar occupations function in identical ways and have corresponding dust exposures. The occupation can also be analyzed on a time basis. The need for this is apparent when we consider that it is possible to have dust produced during only a part of normal operations associated with an occupation. An occupation is composed of many activities, and the worker is exposed to intermittent concentrations of dust. Hence, samples must cover every phase of the workers' activities.

In the following paragraphs examples are given of studies made in the feldspar, mica, and kaolin industries of western North Carolina.

The time analyses, together with the weighting of exposures, follow methods discussed by Bloomfield and DallaValle (*4*).

It must be remembered that the dust counts are used to obtain an *index of dustiness*. Some of the data presented undoubtedly show wide variations which might lay open to serious criticism the averages based upon them. If we hold in mind that an index, or the relative degree of dustiness only is sought, no difficulties should exist. Statistical methods for the treatment of raw-dust-count data are not always warranted, because variations in processes, natural ventilation, and other items affecting dust concentration change from time to time. It is indeed one of the attributes of the method here discussed that the effect of such factors is accounted for without incurring serious discrepancies in large series of dust counts.

AVERAGING AND WEIGHTING OF DUST EXPOSURES

METHODS OF WEIGHTING EXPOSURE WHERE MORE THAN ONE ACTIVITY IS INVOLVED

In small plants, workers are frequently engaged in several different activities. In order to reduce the problem of determining the exposure of such workers to simple terms, it is essential that a study be made of the time spent in each activity. Table 1 illustrates the first steps in the technique used in estimating the exposure of 39 workers in two plants who were engaged in grinding, drying, and bagging mica. The two plants differed as noted in the column headed "activity." In plant A, the ground mica sludge was filtered, dried in rotary kilns, and bagged by mechanical equipment of modern construction; plant B utilized ordinary oven-type kilns to dry the sludge and used manual methods of bagging. In the last column of the table is given the time spent by the various workers in each activity during the course of an 8-hour day. The other columns give the individual dust counts and their arithmetical averages.

TABLE 1.—*Average dust counts and time estimates made in two mica grinding plants where workers partake in all the activities*

Activity	Results of individual samples (million particles per cubic foot)	Arithmetic average (million particles per cubic foot)	Time estimated as spent in activity per day (hours)
Wet grinding and mica settling (both plants)	1.8 5.0 2.6	3.1	2
Filter cake drying (plant A)	24.2 39.6	32.0	3
Kiln drying (plant B)	123 193	158.0	3
Screening and machine bagging (plant A)	34.2 64.6	49.0	3
Screening and hand bagging (plant B)	133 123	128.0	3

Determination of average exposure.—Table 2 shows the method of arriving at a weighted average of the workers' exposure. This consists in multiplying the average dust concentration in each activity by the time spent in it. The sum of these products for each plant, divided by the number of hours (8) spent at work gives the weighted average exposure. Table 2 shows that the workers in plant A were exposed to a weighted average concentration of 31 million particles per cubic foot, while those in plant B were exposed to 116 million particles per cubic foot. If straight arithmetical averages of all the samples for each plant had been used, the estimates would have been 24.6 and 83.0 million particles per cubic foot, respectively. Again, if different times had been assigned to the activities in question, it is evident that very wide discrepancies would exist between the weighted and arithmetical averages. The chief differences between the two methods of expressing the dust exposure associated with a set of activities may be said to be that in the case of the weighted average, emphasis is placed upon duration of exposure, while in the arithmetic average, dependence is placed upon the number and magnitude of individual samples. Here again, however, it must be stressed that there is no absoluteness in the dust exposures arrived at by weighting. It is a convenient way of obtaining an index of dustiness which accounts for all the activities associated with a given job.

TABLE 2.—*Method of determining exposure of workers in a wet mica grinding plant*

Activity	Time estimated as spent in each activity (hours) (a)	Average dust concentration (million particles per cubic foot) (b)	Million particle hours exposure plant A (a×b)	Million particle hours exposure plant B (a×b)
Wet grinding and mica settling (both plants)	2	3.1	6.2	6.2
Filter cake drying (plant A)	3	32.0	96.0	
Kiln drying (plant B)	3	158.0		474.0
Screening and machine bagging (plant A)	3	49.0	147.0	
Screening and hand bagging (plant B)	3	128.0		384.0
Total	8		249.2	924.2

Weighted average: Plant A—$\frac{\text{249 million particle hours per cubic foot}}{\text{8 hours}}$=31 million particles.

Plant B—$\frac{\text{924 million particle hours per cubic foot}}{\text{8 hours}}$=116 million particles per cubic foot.

Another example is furnished in estimating the exposure of drillers and helpers in an open pit feldspar mine. In this case, the drillers were engaged in drilling operations for only 4 hours each day. The remaining 4 hours were spent in mucking and cobbing the feldspar blasted from the working face. The data and computations are shown in table 3. The weighted average is seen to be 33.6 million particles per cubic foot. If no time studies had been made, and reliance were placed merely on the designation implied in the term "driller", the

exposure would have been assumed to be 65 million particles per cubic foot.

TABLE 3.—*Method of calculating the exposure of feldspar drillers and helpers working in an open pit mine*

Activity	Number of samples	Time estimated as spent in each activity (hours) (a)	Average dust concentration (million particles per cubic foot) (b)	Million particle hours per cubic foot exposure (a×b)	Remarks
Drilling	2	4	65	260	Dry drilling.
Mucking, sorting, and cobbing	2	4	2.1	8.4	No drilling.
Total	4	8		268.4	

Weighted average: $\frac{\text{268.4 million particle hours per cubic foot}}{\text{8 hours}}$ = 33.6 million particles per cubic foot.

Method of averaging a widely fluctuating dust exposure.—The examples given above are especially adapted to the weighting of occupations.

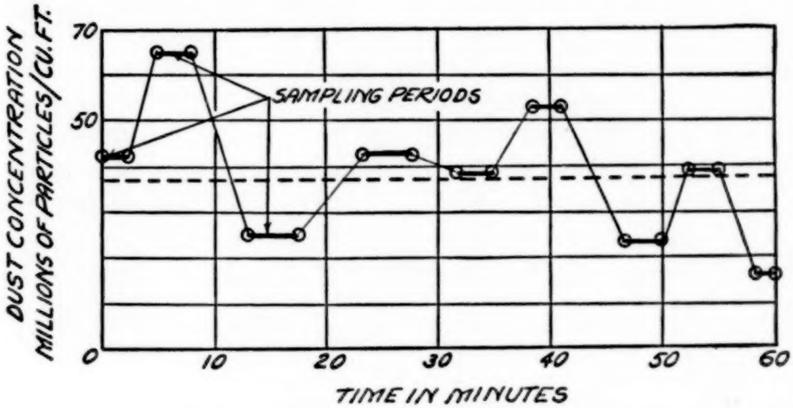

FIGURE 1.—Variation in dust concentration during rock-crushing operations. Dotted line indicates weighted average concentration.

However, with slight modifications the technique can also be applied to the problem of determining the effectiveness of a given piece of dust-control equipment. The procedure consists in taking dust samples at regular intervals over a sufficient period of time to represent all variations in the operation to which it is applied. Figure 1 shows the variations in dust production generated by a hammer type crusher. The dust peaks occur at the times the crusher is loaded. The crusher in question is small and is exhausted near the opening at which the rock is fed.

To calculate the average dust concentration generated by the crusher it is necessary to determine the area under the curve shown in figure 1 and divide by the period of time over which the samples were taken, in this case 1 hour. The average concentration is then seen to be 42 million particles per cubic foot. This value should then

be compared with the criterion of permissibility to determine whether the amount of dust generated is hazardous to health.

WEIGHTING OF OCCUPATIONAL HISTORIES

If a worker has been employed in several occupations over a period of years, some measure of his total dust exposure becomes necessary. This is particularly true when medical findings must be correlated with the amount of the workers' exposure. Any pneumoconiosis is the result of prolonged exposure to dust, and if the worker has been employed in several occupations, all involving different dust exposures, a method of integrating them is essential. The tendency to utilize the exposure in the present occupation in correlating medical with engineering findings may lead to many difficulties. The solution of this problem follows the procedure developed in the previous paragraphs. However, it is subject to the following restrictions: (1) The dust associated with the various occupations must not have changed very much for a number of years, and (2) the dust breathed must not have changed in composition with change of occupation.

Table 4 gives the occupational history of a worker 45 years of age who has been working since the age of 15. Note that the first occupation, namely, that of farmer, was for a period of 10 years and involves no exposure to dust. The succeeding years were spent in feldspar mining and feldspar milling and crushing. The exposure due to these occupations, together with the method of calculating the total and average exposure of the worker, is given in table 5.

TABLE 4.—*Occupational history of a feldspar worker, 45 years old, who began work at the age of 15*

Occupation	Years in nondusty occupation	Years in dusty occupation	Remarks
Farmer	10		
Mucker and sorter		2½	Underground mine, full-time work.
Driller		3	½ time drilling.
Trammer [1]		5	½ time sorting and mucking, feldspar plant.
Farmer	1		
Mill operator		7	½ time sorting and mucking, feldspar plant.
Idle	1½		Estimated.
Total	12½	17½	

[1] Handling wheelbarrow.

The total given in the last column of table 5 is a measure of the lifetime exposure of the worker to feldspar dust. It is an index often sufficiently absolute to indicate whether or not pneumoconiosis is present; that is, when the million particle years of exposure exceed a particular value it may be expected that some lung pathology will be found. The value of this mode of expressing dust counts

has been proven in studies made by the Public Health Service during the past few years (*5, 6, 7*). The weighted average is equally valuable when it is desired for statistical purposes to group workers with the same degree of exposure, by years of employment.

TABLE 5.—*Weighting of exposure of worker whose occupational history is given in table 4*

Activity	Time spent in stated activity (years) (a)	Average dust concentration associated with occupation (million particles per cu. ft.) (b)	Million particle years exposure (a×b)
Mucking and sorting	2½	239	597
Drilling	3	[1] 500	1,500
Tramming	5	20	100
Mill operating	7	270	1,890
Total	17½		4,087

[1] Weighted average to take account of time spent mucking and sorting.

$$\text{Weighted average exposure} = \frac{4{,}087 \text{ million particle years per cu. ft.}}{17.5 \text{ years}} = 234 \text{ million particles per cu. ft.}$$

CONCLUSIONS

It would seem preferable, in view of the number of variables involved, to classify dust counts in broad categories. Thus, counts could simply be expressed as being greater or less than a maximum tolerance, say the threshold limit, without any reference to the actual counts themselves. This term is usually taken to mean the maximum permissible limit of dust concentration. The threshold limit may be arbitrary, being based on engineering practices alone, or it may be derived from a correlation of dust concentrations with medical findings. It is likewise apparent from a consideration of the foregoing that a standard may be considered as a maximum irrespective of the activities engaged in, or as a weighted average based on a careful time analysis of all activities. The former interpretation appears in some State regulations. A threshold limit having a medico-engineering basis requires that all factors entering into the occupational environment, including time studies, should be considered. By this latter method, an upper permissible limit can be exceeded for an interval of time although the weighted average may well be less than the limit. A threshold limit, therefore, should state whether it is a maximum to be complied with at all times during a given activity or whether it is a weighted average based on a consideration of the time engaged in various phases of the work being carried on.

The minimum number of samples necessary to determine whether an environment meets the accepted tolerance is another important consideration. In the bacterial analysis of water supplies, a set num-

ber of samples taken from a given source must meet a fixed standard before approval can be given. This suggests that a similar approach can be developed for sanitary air analysis, taking into account the fact that the complex nature of most occupations does not permit a simple rationalization of the environment. The following rules, however, help formulate certain principles:

1. The activities associated with a given occupation should be analyzed and the length of time given to each activity carefully determined.

2. At least two representative samples should be obtained for each activity. The amount of these samples is immaterial so long as they represent normal operating conditions. If dust concentrations vary widely, the number of samples should be increased so that a fair average or median may be struck.

3. The concentration determined for each activity should be weighted according to its duration. The weighted average of all the activities should then be taken to represent the occupational exposure.

Finally, dust counts are valuable in obtaining a quantitative measure of the workers' environment so long as the limitations of the technique used are appreciated. Accurate methods of sampling and counting dust are not necessary because of the many variables entering into the production of dust by a given activity. Dust counts should be regarded as *indices* of dustiness. The dust exposure of a worker cannot be estimated by dust counts alone, but requires careful studies to determine variations in the rate of dust production and the activities engaged in. It is only through an appreciation of the limitations of dust-counting technique and a study of the working environment that dust counts can be expected to achieve any significance.

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STUDIES OF THE ACUTE DIARRHEAL DISEASES

II. Parasitological Observations

By BERTHA KAPLAN SPECTOR,[1] *Protozoologist, United States Public Health Service,* and A. V. HARDY, *Consultant, United States Public Health Service and Assistant Professor of Epidemiology, DeLamar Institute of Public Health, Columbia University,* with the statistical assistance of MARY GRAHAM MACK, *Statistical Assistant, United States Public Health Service*

INTRODUCTION

The incidence of *Endamoeba histolytica* infestation which we (*1*) found in the study of a water-borne outbreak of acute diarrheal disease among Chicago firemen in 1934 was 42.4 percent in mild cases and 62.1 percent in severe cases, as compared with 15.5 percent for healthy controls. The clinical disorders appeared to subside as the result of the use of specific amebicides. These observations and the occurrence of a few frank cases of amebic dysentery led to the tentative opinion that *E. histolytica* probably had an etiological role in this particular outbreak. Consequently, in undertaking the investigation of endemic diarrheal diseases in northern New Mexico and Arizona, parallel bacteriological and protozoological studies were planned.

EPIDEMIOLOGICAL SETTING

This study was limited to cases of acute diarrheal disease, their household contacts and representative samples of different racial groups. The population in the Southwest includes Indians (Pueblo and Navajo), "Spanish-Americans," and "Anglo-Americans." The Pueblo Indians live in relatively compact small villages and the Navajos in isolated ranch homes. The majority exist near a bare subsistence level, in houses which are small and overcrowded. Water is frequently scarce, and cleanliness of premises and person are difficult to attain. With rare exceptions privies are a recent innovation; human excrement is deposited commonly in the open, often in the nearby corrals or even closer to unscreened houses. The "Spanish-Americans" live almost exclusively in small villages or in urban areas. Their homes, ordinarily, are provided with privies, but a majority of these remain defective or grossly insanitary. The living conditions of the Spanish-speaking people of New Mexico, excluding the small proportion of economically successful families, are not markedly different from those found among the Indians. A relatively large percentage of the "Anglos" have adequate incomes, satisfactory homes, nutritious diets, and live with the convenience and protection of modern sanitation. However, this racial group has a large component of those who came to the region seeking health and many of their homes reveal all of the ill effects of sickness and poverty. The favorable climate

[1] Deceased March 26, 1938.

attracts also substantial numbers of impoverished family groups whose surroundings often are suggestive of indifference and incompetence.

The climate of New Mexico, as of Arizona, is outstanding for its large amount of sunshine and low precipitation.

PROCEDURES

Duplicate stool specimens were collected—a small amount of the feces in preservative for bacteriological analysis and the remainder of the stool in a carton for parasitological study. From individuals ill with diarrheal disease and from their household contacts we tried to obtain, routinely, three specimens for bacteriological analysis, but second and third specimens for protozoological examination ordinarily were not collected. However, a second specimen was obtained in 25 percent of the cases and 20 percent of their household contacts; in a smaller proportion a third specimen was secured. We requested one sample only in the examination of other healthy individuals. Thus, these are predominantly the findings yielded by one examination per individual. To obtain a more adequate protozoological survey of the Indians, specimens for parasitological examination only were collected from healthy adolescents in residence at the Albuquerque Indian School, from those with miscellaneous diseases in the Albuquerque, Fort Defiance, and Fort Wingate general hospitals, and from patients in the Albuquerque and Fort Defiance Tuberculosis Sanatoria.

One investigator (B. K. S.) was responsible entirely for the parasitological laboratory observations. Routinely, reliance was placed upon the direct microscopic examination of the saline and iodine preparations. Cultures for *E. histolytica* were not employed and the iron-hematoxylin stain was used in particularly interesting or exceptional cases only. The brine concentration technique was carried out on a series of 100 specimens in the study of the occurrence of the various helminth ova. The findings did not differ significantly from those recorded during the usual microscopic search.

LABORATORY OBSERVATIONS

We have considered separately those individuals ill with acute diarrheal disease and those well at the time of the examination, and have divided the Indians from the non-Indians.

The lowest incidence of *E. histolytica* carriers was found among the miscellaneous patients in St. Joseph's Hospital (table 1). These were largely English-speaking and many were paying part or all of their hospital expenses. They are considered to be generally representative of the families able to patronize private hospitals. Three (2.6 percent) *E. histolytica* carriers were found among the 116 examined. With this one exception, however, the findings reveal a

relatively high incidence of infestation. The rates were particularly high in two of the three Spanish communities—Atrisco-Arenal, a suburban area, with 22 percent, and Barelas Road, an urban area, with 23.7 percent. In the third, Chilili, an isolated village, the rate was 12.4 percent. The family contacts of the Albuquerque cases were both "Anglo" and "Spanish," and their rate was 14.1 percent for 1936 and 7.1 percent for 1937. (The protozoological records for 1936 did not contain, always, a statement of the clinical condition of those being examined, and it is known that some cases of acute diarrheal disease are included with these "noncases".) The other two non-Indian groups were a small number of university personnel engaged in field archeological studies (Chaco Canyon, 14.3 percent) and a tourist camp (Dreamland Camp, 14.3 percent) both of which communities had shown cases of acute diarrheal disease. The infestation rate for *E. histolytica* in the total (1,284) non-Indian group with no diarrheal disease was 14.8 percent.

TABLE 1.—*Incidence of* E. histolytica *in 1,295 Indians and 1,430 non-Indians in the Southwest, 1936 and 1937*

WITHOUT DIARRHEAL DISEASES

Location	Type of group examined	Number examined	Number positive	Percent positive
Non-Indian				
St. Josephs Hospital	Miscellaneous patients, chiefly Anglo.	116	3	2.6
Albuquerque (food handlers)	Representative Anglo and Spanish employees.	124	13	10.5
Albuquerque	Anglo and Spanish family contacts of cases of acute diarrhea:			
	1936	361	51	14.1
	1937	126	9	7.1
Chilili	Spanish residents of isolated village	89	11	12.4
Dreamland Camp	Anglo	7	1	14.3
Chaco Canyon	Anglo—University personnel	7	1	14.3
Atrisco-Arenal	Suburban Spanish	395	87	22.0
Barelas Road	Urban Spanish	59	14	23.7
Total		1,284	190	14.8
Indian				
Fort Wingate Hospital	Miscellaneous hospital patients—Navajo.	42	4	9.5
Isleta	Family contacts of acute diarrhea—Pueblo.	21	3	14.3
Laguna	Representative village residents—Pueblo.	82	15	18.3
Albuquerque Indian Hospital	Miscellaneous hospital patients—Pueblo.	109	23	21.1
Cochiti	Representative village residents—Pueblo.	230	51	22.2
Albuquerque Indian School	Children chiefly 10-16 years—Pueblo	285	73	25.6
Albuquerque Tuberculosis Sanatorium.	Hospital patients—Mixed	89	23	25.8
"Sawmill"	Employed laborers—Navajo	15	4	26.6
Fort Defiance Indian Hospital	Miscellaneous patients—Navajo	128	38	29.7
Albuquerque Indian School	Children chiefly 10-16 years—Navajo	93	27	29.0
Fort Defiance Tuberculosis Hospital.	Hospital patients—Navajo	39	12	30.8
San Felipe	Representative village residents—Pueblo.	135	55	40.7
Total		1,268	328	25.9

TABLE 1.—*Incidence of* E. histolytica *in 1,295 Indians and 1,430 non-Indians in the Southwest, 1936 and 1937*—Continued

WITH DIARRHEAL DISEASES

Location	Type of group examined	Number examined	Number positive	Percent positive
Non-Indian				
St. Josephs Hospital	Hospital patients	4	0	0
Albuquerque	Anglo and Spanish cases of acute diarrhea.	100	6	6.0
Chaco Canyon	Anglo—University personnel	11	1	9.1
Chilili	Spanish residents of isolated village	22	2	9.1
Atrisco	Suburban Spanish	7	1	14.3
Total		146	10	6.8
Indian				
Albuquerque Indian Hospital	Miscellaneous hospital patients	8	0	0
Cochiti	Representative village residents	19	2	10.5
Total		27	2	7.4

The Indians without diarrheal disease (1,268) all showed a high rate of infestation, averaging 25.9 percent, one village (San Felipe) reaching 40.7 percent positive in the 135 examined. The incidence rate (not summarized in table 1) among 317 Navajos was 26.8 percent and in the Pueblo group (862) the rate was 25.6 percent. Considering the usual isolation of the Navajo homes, a difference in this direction was unexpected.

The proportion of positives among those examined when ill with an acute diarrheal disease was materially less (Indian 7.4 percent and non-Indian 6.8 percent) than in those free of this disorder. It has been established by bacteriological findings that the infections were predominantly bacillary dysentery (*2*, *3*).

The type of *E. histolytica* cysts found in each of the groups is indicated in table 2. It is noted that the small cyst variety predominated. Considering the large cysts found alone or in association with the small variety, only 10 percent of the Indians and 6 percent of the non-Indians without diarrheal disease were found to harbor the large variety. The non-Indians with diarrheal disease also showed a greater preponderance of small cysts. Trophozoites were not included in the table, since these were observed only once in the 2 years in a typical case of amebic dysentery. Clinical disorders even suggesting amebic dysentery, though expected and sought, were seen infrequently and, when encountered, special care was taken to obtain very fresh specimens. We believe that our observations adequately confirm the presence of a high rate of infestation with *E. histolytica* and an exceedingly low incidence of clinical amebic dysentery in the groups examined.

TABLE 2.—*Classification of types of* E. histolytica *present in 1,295 Indians and 1,430 non-Indians examined in the Southwest, 1936 and 1937*

WITHOUT DIARRHEAL DISEASES

Location	Size of *E. histolytica* cyst			
	Large	Small	Both	Total
Non-Indian				
St. Josephs Hospital	1	2	0	3
Albuquerque food handlers	4	9	0	13
Albuquerque	21	32	7	60
Chilili	3	6	2	11
Dreamland Camp	0	1	0	1
Chaco Canyon	0	1	0	1
Atrisco	28	43	11	82
Arenal	0	3	2	5
Barelas Road	4	7	3	14
Total	61	104	25	190
Percent	32.1	54.7	13.2	100.0
Indian				
Fort Wingate Hospital	2	2	0	4
Isleta	0	1	2	3
Laguna	4	9	3	16
Albuquerque Indian Hospital	7	15	1	23
Cochiti	12	30	9	51
Albuquerque Indian School—Pueblo	18	43	12	73
Albuquerque Tuberculosis Sanatorium	3	20	0	23
"Sawmill"	1	[1] 2		4
Fort Defiance Indian Hospital	11	22	5	38
Albuquerque Indian School—Navajo	10	14	3	27
Fort Defiance Tuberculosis Sanatorium	3	9	0	12
San Felipe	14	32	9	55
Total	85	199	44	328
Percent	25.9	60.7	13.4	100.0

WITH DIARRHEAL DISEASES

Location	Large	Small	Both	Total
Non-Indian				
Albuquerque	1	4	1	6
Chaco Canyon	1	0	0	1
Chilili	0	2	0	2
Atrisco	0	1	0	1
Total	2	7	1	10
Percent	20.0	70.0	10.0	100.0
Indian				
Cochiti	2	0	0	2
Total	2	0	0	2
Percent	100.0			

[1] 1 intermediate.

E. histolytica was identified much less frequently in children under 5 years of age (table 3) than in the other age groups. Among the cases with acute diarrheal disease there was only one (1.2 percent) positive out of the 85 examined, and 21 (8.3 percent) from the 254 examinations made of those without diarrheal disease. In the age groups 5–64 years, in which substantial numbers were examined, there were no marked variations in the proportion of positives revealed, since the rates always approached 25.9 percent for the total Indians and 14.3 percent for the non-Indian group. The carrier incidence for the group 65 years and over was higher.

The infestation rates for healthy Indian and non-Indian females was above that of the males. The Indians examined showed 195

(29.4 percent) positives for *E. histolytica* among 664 females and 133 (22 percent) among 604 males; the non-Indians included 109 (16 percent) positive among 673 females and 82 (13.4 percent) among 611 males. Twelve individuals with diarrheal disease were found to harbor *E. histolytica;* seven were males and five females.

TABLE 3.—*Age distribution of Indians and non-Indians in the Southwest examined for* E. histolytica *in 1936 and 1937*

WITHOUT ACUTE DIARRHEAL DISEASE

Age group	Indian				Non-Indian			
	Positive		Negative		Positive		Negative	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5	12	8.6	128	91.4	9	7.9	105	92.1
5 to 14	104	30.4	238	69.6	19	12.4	134	87.6
15 to 24	104	26.5	289	73.5	15	12.1	109	87.9
25 to 34	32	26.0	91	74.0	19	14.6	111	85.4
35 to 44	19	28.8	47	71.2	10	14.3	60	85.7
45 to 54	14	26.4	39	73.6	4	11.8	30	88.2
55 to 64	4	16.0	21	84.0	2	13.3	13	86.7
65 and over	14	41.2	20	58.8	27	53.0	24	47.0
Unknown [1]	25	27.2	67	72.8	15	10.1	134	89.9
Total	328	25.9	940	74.1	120	14.3	720	85.7

WITH ACUTE DIARRHEAL DISEASE

Age group	Indian Positive Number	Indian Positive Percent	Indian Negative Number	Indian Negative Percent	Non-Indian Positive Number	Non-Indian Positive Percent	Non-Indian Negative Number	Non-Indian Negative Percent
Under 5	0	----------	15	100.0	1	1.4	69	98.6
5 to 14	0	----------	3	100.0	2	8.0	23	92.0
15 to 24	0	----------	1	100.0	3	13.0	20	87.0
25 to 34	1	33.3	2	66.7	2	33.3	4	66.7
35 to 44	0	0	0	0	0	0	10	100.0
45 to 54	1	33.3	2	66.7	1	11.1	8	88.9
55 to 64	0	0	1	100.0	----------	0	1	100.0
65 and over	0	0	0	0	1	50.0	1	50.0
Unknown [1]	0	0	1	100.0	0	0	0	0
Total	2	7.4	25	92.6	10	6.9	136	93.1

[1] Exclusive of 444 non-Indians examined in 1936 with age unrecorded.

The occurrence of other pathogenic and nonpathogenic parasites also has been ascertained and is summarized in table 4. The high incidence of infestation with *Endamoeba coli* (45 percent) in the Indians is apparent. The flagellates *Giardia lamblia* and *Chilomastix mesnili* are slightly more common in the non-Indian group than in the Indian group. Except for *Hymenolepis nana,* the ova of helminths were encountered rarely. The total absence of hookworm infestation and the almost complete absence of *Ascaris* are related, probably, to the dryness of the soil in this area. The relatively low incidence of *Enterobius vermicularis* is without particular significance, since it is a well-known fact that the brine flotation method or the direct smear method will disclose only a small percentage of the infections for the reason that the ova of this parasite are not ordinarily deposited in the intestinal tract of the host but are expelled after the migration of the gravid female out of the anus.

TABLE 4.—*The incidence of parasites in 1,295 Indians and 1,430 non-Indians examined in the Southwest, 1936 and 1937*

Parasite	Indian		Non-Indian	
	Number positive	Percent positive	Number positive	Percent positive
Endamoeba histolytica	330	25.5	200	14.0
Endamoeba coli	583	45.0	400	28.0
Endolimax nana	67	5.2	46	3.2
Iodamoeba bütschlii	160	12.4	46	3.2
Dientamoeba fragilis	1	.08	3	.21
Giardia lamblia	120	9.3	194	13.6
Chilomastix mesnili	112	8.6	132	9.2
Trichomonas hominis	10	.77	1	.07
Taenia spp	3	.23	1	.07
Hymenolepis nana	79	6.1	32	2.2
Enterobius vermicularis	2	.15	3	.21
Ascaris lumbricoides	1	.08	0	0

COMPARISONS WITH THE FINDINGS IN OTHER AREAS

A detailed comparison of our findings with those of other workers is not attempted but from the adequate summaries of incidence given by Craig and Faust (*4*), we note an incidence of *E. histolytica* of 10.2 percent for the 57,561 individuals from the various groups in the United States. Infestation of Indians (25.9 percent), therefore, was greatly in excess and that of the "Spanish-Americans" (14.8 percent) higher than the general incidence noted above. Previously reported rates above 20 percent have been unusual and above 25 percent quite rare. Although the number of examinations was small, the St. Joseph's Hospital sample indicated that the incidence in "Anglos" was in line with the findings in other groups living under satisfactory sanitary conditions.

As in most studies, the occurrence of *E. coli* was found to parallel and exceed that of *E. histolytica*. Craig and Faust note two studies in Tennessee in which the infestation rates (31.7 percent and 32.1 percent) exceeded slightly our observations among non-Indians (28 percent) but they mention no area in the United States where it has been found to approach the 45 percent noted in Indians.

Iodamoeba bütschlii was observed also with unusual frequency (Indians 12.4 percent and non-Indians 3.2 percent) but *Endolimax nana* was found less frequently (Indians 5.2 percent and non-Indians 3.2 percent) than by other workers. *Dientamoeba fragilis* was found in a small fraction of 1 percent of individuals examined as in other areas.

Only one of the flagellates (*Chilomastix mesnili*) had an incidence which was found to be high as compared with that in other regions. Craig and Faust cite two studies of patients, one in Texas with 7.5 percent and the other in New Orleans with 1.4 percent positive; also, two surveys in Tennessee with 3.8 percent and 2.9 percent positive. Therefore, our observations of 8.6 percent infestation in

Indians and 9.2 percent in non-Indians show a somewhat higher incidence than that usually recorded.

Infestations with *Taenia* spp. occur, but the data are not adequate for comparison with the incidence found elsewhere. According to Craig and Faust, *Hymenolepis nana* "is the most common tapeworm in the United States and is diagnosed in about 1 percent of fecal examinations made in the southern United States." Thus the incidence of this parasite among Indians (6.1 percent) is exceptionally high and among non-Indians (2.2 percent) is higher than the average.

COMMENT

The spread of *E. histolytica* is dependent upon a relatively direct dissemination of human excrement. The occurrence of *E. coli* in man "is proof positive of the consumption of materials contaminated by sewage" (*4*). The tapeworm, *Hymenolepis nana,* is transmitted usually from man to man without an intermediate host. Consequently, the incidence of these parasites should be an index of the ease of dissemination of human excrement from person to person, and the high incidence among Indians and "Spanish-Americans" is related undoubtedly to the defects in their communal, home, and personal sanitary practices. These same defects might be expected to permit a ready spread of the enteric bacterial infections.

The question of immunity to *E. histolytica* is brought forward again by our findings. *E. histolytica* is accepted as an ameba pathogenic for man; however, "there is considerable evidence that different strains of this parasite vary in virulence" (*4*). In the present survey, the complete absence of complaint of even minor intestinal disorder, and the lower incidence of "carriers" in persons with diarrheal disorders as compared with healthy individuals is of interest. Furthermore, the rarity of frank cases of clinical amebic dysentery has been striking. These observations are at variance with those made in the Chicago amebic dysentery epidemic (*5*), in which the case incidence among exposed individuals reached 11.6 percent. It is of practical importance to know the factors which permit the frequent occurrence of clinical amebiasis, and it is of no less interest to know why amebic dysentery should be rare in an area in which infestation with *E. histolytica* was so common. Our findings indicate further the need for additional information concerning the pathogenicity of various strains of *E. histolytica*, the question of resistance of the host under various conditions of environment and exposure, the degree of exposure necessary to produce clinical symptoms, and other considerations involving the host-parasite relationship.

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BREAST CANCER IN BREEDING AND VIRGIN "A" AND "B" STOCK FEMALE MICE AND THEIR HYBRIDS[1]

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No genetic theory on the inheritance or transmission of breast cancer in mice has been advanced since the publication of the findings of the staff of the Jackson Memorial Laboratory in 1933 (*1*) incorporating these data. The work on foster-nursing (*2*, *3*, *4*, and *5*) has demonstrated, however, that, in some stocks, a "breast cancer-producing influence" is transferred in the milk of high cancer stock females and plays an important rôle in mammary cancer etiology. This work has been confirmed by Andervont (*6*). It is obvious that other contributing causes must be considered.

In table 1 the breast-cancer ratios are tabulated for the breeding and virgin females of the high cancer "A" and the low cancer "B" (C57 black) stocks and their reciprocal first and second generation hybrids. The term "cancer" implies that the individual developed spontaneous breast cancer. This type of tumor was not recorded for the so-called noncancerous animals, although many gave rise to various other types of neoplasia.

BREEDING FEMALES

The mammary gland tumor incidence for the breeding females of the "A" stock was 83.6 percent. The "B" stock data are from Little, Murray, and Cloudman (*7*), who found that 3 of 568 breeding females developed mammary cancer, or 0.5 percent. The ABF_1 females obtained by mating "A" ♀ × "B" ♂ gave 94.9 percent cancer for the 118 mice observed. One hundred and eighteen ABF_2 individuals were examined and had a tumor ratio of 71.4 percent. The incidence for the BAF_1 hybrid mice (B ♀ × A ♂) was 1.9 percent for the 108 mice

[1] Supported by a grant-in-aid from the National Cancer Institute.

recorded, and no tumors were observed among the 112 breeding BAF_2 mice.

TABLE 1.—*Breast tumor ratios and average ages for "A" and "B" stock mice and their hybrids*

	Number	Cancer	Percent cancer	Average age, in months	
				Cancerous	Noncancerous
BREEDING ♀					
A	1,093	914	83.6	11.1	11.4
B[1]	568	3	.5	21.4	20.8
ABF_1	118	112	94.9	11.2	12.8
ABF_2	98	70	71.4	12.7	18.1
BAF_1	108	2	1.9	18.0	21.1
BAF_2	112	0	0		20.7
VIRGIN ♀					
A	223	11	4.9	18.5	18.7
B[1]	135	0	0		26.4
ABF_1	111	5	4.5	21.9	26.7
ABF_2	119	2	1.7	20.0	23.1
BAF_1	104	0	0		28.6
BAF_2	120	0	0		24.6

[1] From Little, Murray, and Cloudman (7).

The average breast tumor ages for the "A" stock and ABF_1 generation animals were 11.1 and 11.2 months, respectively. Noncancerous mice of the latter class lived slightly longer than did similar "A" strain animals (11.4 and 12.8 months). The cancer and noncancer mean ages for "B" stock mice were 21.4 and 20.8 months. Breast cancer was observed in ABF_2 hybrids which averaged 12.7 months, whereas the noncancerous individuals of the generation survived to an average age of 18.1 months. Two BAF_1 mice had cancer at a mean age of 18.0 months. The respective noncancer ages for the BAF_1 and BAF_2 mice were 21.1 and 20.7 months.

VIRGIN FEMALES

The tumor incidence for the "A" stock virgin females, numbering 223, was 4.9 percent. The "B" stock ratio for 135 mice was 0 percent. The respective ratios for the ABF_1 and ABF_2 generation hybrids are 4.5 percent and 1.7 percent. Breast tumors were not observed in the BAF_1 and BAF_2 virgin females.

The average tumor ages for the "A," ABF_1, and ABF_2 mice, determined in every instance from a small number of mice, varied from 18.5 months to 21.9 months. The "A" stock noncancerous mean age was 18.7 months and the "B" stock 26.4 months. Twenty-three months represented the youngest average nontumor age for any class of the hybrid virgin females and the BAF_1 group averaged 28.6 months at death.

The mammary gland tumor ratios for the breeding and virgin females are represented diagrammatically in table 2.

TABLE 2.—*Diagrammatical representation of the breast tumor ratio for virgin and breeding females of the "A" and "B" stocks and their hybrids*

BREEDING FEMALES		VIRGIN FEMALES	
A ♀ —×— B ♂	B ♀ —×— A ♂	A ♀ —×— B ♂	B ♀ —×— A ♂
84%	1.0%	5%	0%
ABF_1	BAF_1	ABF_1	BAF_1
95%	2%	5%	0%
ABF_2	BAF_2	ABF_2	BAF_2
71%	0%	2%	0%

In previous work it was observed that the breast cancer ratio in breeding "A" stock females and their hybrids might be significantly reduced by foster-nursing to low-cancer stock females (*2*, *3*). Maintaining the "A" stock females as virgins produced the same results (*8*). The virgin ABF_1 and ABF_2 females gave breast cancer ratios (4.5 percent and 1.7 percent) comparable with those observed for "A" stock virgin females (4.9 percent). The ratio for the ABF_1 breeding females (94.9 percent) was higher than the "A" stock incidence for similar animals (83.6 percent), whereas the ABF_2 percentage (71.4 percent) was lower than the "A" stock observation. Both breeding and virgin BAF_1 and BAF_2 hybrids gave results approaching that recorded for the low-cancer stock females.

The marked difference in breast tumor development in the virgin and breeding females of the "A" stock and ABF_1 and ABF_2 classes was apparently due to the production of young by the group showing the highest incidence. ABF_1 and BAF_1 having tumor ratios of 94.9 percent and 1.9 percent, respectively, differed only in the source of the milk which they obtained while nursing, as these ratios may be reversed by reciprocal foster-nursing (*3*). The percentages in the ABF_1 and ABF_2 generation mice are indicative of the expectation for an inherited susceptibility which is a single dominant character.

The breast cancer observations obtained for the "A" and "B" stock mice and their hybrids may be explained by a theory on the cause of breast cancer, assuming that three "factors" are needed for etiology. These factors are:

(A) A "breast cancer-producing influence" transferred through the milk of high-cancer stock females to their progeny. This has been designated as the "milk factor" in the tables.

(B) An inherited breast cancer susceptibility transmitted by high-cancer stock individuals (both males and females) to their descendants according to genetic principles. This susceptibility complex may be one or more dominant Mendelian factors, and thus only the hetero-

zygous condition is needed. The results are compared with the expectation on the assumption that only one factor is required. Other interpretations are possible and further experiments to test this point are in progress.

(C) The production of young is usually a necessary antecedent for the development of breast cancer in "A" stock mice and their hybrids. This factor is called the "breeding factor." This condition would include any influence which might alter or prepare the physiological state of the cell prior to the cancerous transformation. It would take into consideration such causes as any hormonal stimulation. For strains which show a high ratio of breast cancer among virgin females this effect might be termed the "hormonal factor" instead of the "breeding factor." The latter has been used because breeding is a prerequisite for the development of mammary gland cancer in "A" stock mice and their hybrids.

The expected and observed cancer ratios are compared in table 3 for the breeding mice and in table 4 for the virgin females.

TABLE 3.—*Comparison of the observations and expectations for breast cancer in the "A" and "B" stocks and their hybrids according to the theory that mammary cancer may be caused by the simultaneous presence of 3 factors, 1 of which is an inherited dominant transmitted by the high-tumor stock animals*

BREEDING FEMALES

	A ♀ —— × —— B ♂	B ♀ —— × —— A ♂
Milk factor	+	−
Inherited factor	+	−
Breeding factor	+	+
Expectation	100%	0%
Observation	84%	1%
	ABF$_1$	BAF$_1$
Milk factor	+	−
Inherited factor	+	+
Breeding factor	+	+
Expectation	100%	0%
Observation	95%	2%
	ABF$_2$	BAF$_2$
Milk factor	+	−
Inherited factor	Segregation	Segregation
Breeding factor	+	+
Expectation	75%	0%
Observation	71%	0%

TABLE 4.—*Comparison of the observations and expectations for breast cancer in virgin females of the "A" and "B" stocks and their hybrids according to the theory that mammary cancer may be due to the simultaneous presence of 3 "exciting" factors*

VIRGIN FEMALES

	A ♀ × B ♂	B ♀ × A ♂
	A ♀	B ♀
Milk factor	+	−
Inherited factor	+	−
Breeding factor	−	−
Expectation	0%	0%
Observation	5%	0%
	ABF$_1$	BAF$_1$
Milk factor	+	+
Inherited factor	+	+
Breeding factor	−	−
Expectation	0%	0%
Observation	5%	0%
	ABF$_2$	BAF$_2$
Milk factor	+	−
Inherited factor	Segregation	Segregation
Breeding factor	−	−
Expectation	0%	0%
Observation	2%	0%

"B" stock females lack the "milk factor," as the high-cancer young fostered by these females have a low tumor incidence. The inherited cancer susceptibility is also absent, because the breast tumor ratio is not materially increased in "B" stock females nursed by "A" stock mothers. Although the breeding factor was present, the expectation for "B" females is 0 percent or similar to the observed data. The BAF$_1$ females inherit the cancer susceptibility factor from the "A" stock males; but, as the "milk factor" is wanting, the expectation is 0 percent and the observed ratio is 2 percent. The BAF$_2$ results were as expected, or 0 percent.

The "milk" and "breeding" factors were common to the A, ABF$_1$, and ABF$_2$ mice. The inherited susceptibility factor was homozygous in the "A" stock mice and heterozygous in the ABF$_1$ hybrids. The expected breast-cancer ratios are 100 percent in each class, and the recorded percentages are 84 for the "A" stock and 95 for the ABF$_1$ hybrids. In the ABF$_2$ generation the milk and breeding influences are present. In this generation there would be the segregation of the cancer susceptibility factor, which would give an expected incidence of 75 percent as compared to the observed incidence of 71 percent.

In the virgin female groups the calculated results should be in every class 0 percent, as all lack at least the breeding factor. In addition, the "milk factor" is wanting in the "B," BAF$_1$, and BAF$_2$ mice. "A" stock females gave 5 percent; ABF$_1$, 5 percent; and ABF$_2$, 2 percent. Tumors were not observed in the other classes.

The relationship and the importance of each "factor" may vary according to the stock tested. Some strains show a high cancer ratio in virgin females and others a very low ratio. The absence of the "milk

factor" (*5, 6*) will reduce the percentage of breast tumors in all stocks tested and the ratio in breeding females may approach that for low cancerous stocks.

Breast tumors in mice which develop in low tumor stocks and in the descendants of fostered noncancerous high tumor stock mice cannot be accounted for with the assumption just mentioned. Growths which develop in virgin females of strains such as the "A" stock would probably fall in the same classification. Such tumors are probably due to other causes (*4*) and may be due to changes in the cell which resemble somatic mutations, as the tendency is not transmitted to their progeny.

SUMMARY

Breast tumors in "A" stock mice and their hybrids may be grouped into two classes:

1. Those resulting from changes in the cell similar to somatic mutations. Such tumors may not be transmitted and usually develop late in life.

2. Others due to the simultaneous presence of three "factors", which are as follows:

(A) A "breast cancer-producing influence" transmitted in the milk of high-cancer stock mothers.

(B) A breast cancer susceptibility transmitted by high-cancer stock individuals of one or more dominant Mendelian factors.

(C) The production of young or the "breeding factor" is also required.

Given the inherited susceptibility, the relationship between the milk factor and the breeding factor differs with different stocks. In some stocks the absence of the breeding factor may delay but not decrease the breast-tumor ratio. In such stocks when the "breast cancer-producing influence" is wanting, the breast tumor incidence is reduced.

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PLURAL BIRTHS—RATIO TO TOTAL BIRTHS—CORRECTION

On page 1049 of the Public Health Reports for June 16, 1939, the statement regarding the ratio of plural births to total births was incorrect. It should have read as follows: "The ratios of these figures for multiple births to total births approximate the ratios based on the frequently mentioned factor of the ascending power of 80, that is, the ratio of twins to total births as 1 in 80, of triplets, 1 in 80^2, of quadruplets, 1 in 80^3, and so on. On the basis of this mathematical formula the number of sets of twins born in 1937 would have been 25,416, of triplets, 318, and of quadruplets, 4, the last being the actual figure for that year." The actual number of sets of twins born in 1937 was 24,881, and of triplets, 219. (In all these instances at least 1 was a live birth.)

DEATHS DURING WEEK ENDED JUNE 3, 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended June 3, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	7,952	[1] 7,814
Average for 3 prior years	[2] 8,078	
Total deaths, first 22 weeks of year	199,351	191,186
Deaths under 1 year of age	498	[1] 477
Average for 3 prior years	[2] 498	
Deaths under 1 year of age, first 22 weeks of year	11,703	11,798
Data from industrial insurance companies:		
Policies in force	67,305,304	68,305,548
Number of death claims	10,089	10,143
Death claims per 1,000 policies in force, annual rate	7.8	7.7
Death claims per 1,000 policies, first 22 weeks of year, annual rate	11.5	9.8

[1] Data for 87 cities.
[2] Data for 86 cities.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables, a zero (0) indicates a positive report and has the same significance as any other figure, while leaders (----) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

Cases of certain diseases reported by telegraph by State health officers for the week ended June 10, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934-38, median	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934-38, median	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934-38, median
NEW ENG.												
Maine	0	0	2	1	------	------	2	------	887	147	105	105
New Hampshire	0	0	0	0	------	------	------	------	132	13	101	75
Vermont	0	0	0	0	------	------	------	------	1,407	105	96	65
Massachusetts	4	3	1	5	------	------	------	------	1,317	1,120	526	634
Rhode Island	0	0	0	1	------	------	------	------	809	106	2	63
Connecticut	0	0	5	4	9	3	4	3	2,190	738	59	218
MID. ATL.												
New York [1]	9	22	27	38	[1] 5	[1] 7	[1] 4	[1] 4	743	1,856	3,665	2,746
New Jersey [2]	15	13	18	16	------	------	2	8	61	51	477	746
Pennsylvania [2]	15	30	25	43	------	------	------	------	84	165	1,942	1,942
E. NO. CEN.												
Ohio	6	8	13	18	5	7	------	5	18	24	997	997
Indiana	10	7	6	11	16	11	1	6	12	8	279	279
Illinois [2]	18	27	26	39	12	18	10	18	26	40	753	753
Michigan [3]	11	10	7	8	1	1	1	1	299	283	2,683	356
Wisconsin	0	0	0	1	65	37	------	19	1,206	686	2,822	1,953
W. NO. CEN.												
Minnesota	2	1	3	3	2	1	2	2	322	166	412	311
Iowa [2]	8	4	2	2	------	------	------	------	338	167	298	220
Missouri [2]	12	9	14	24	1	1	3	12	10	8	98	98
North Dakota	0	0	1	1	131	18	7	1	124	17	84	11
South Dakota	0	0	0	2	15	2	------	------	879	117	------	8
Nebraska	8	2	4	4	------	------	------	------	504	132	154	119
Kansas	0	0	1	4	6	2	3	1	159	57	257	257
SO. ATL.												
Delaware [2]	0	0	2	2	------	------	------	------	394	20	4	23
Maryland [2, 3]	3	1	7	6	6	2	3	3	694	225	67	195
Dist. of Col.	0	0	5	7	------	------	------	------	1,463	181	16	34
Virginia [2, 4]	17	9	2	6	324	173	------	------	819	437	339	339
West Virginia	19	7	3	11	19	7	3	17	16	6	212	143
North Carolina [4]	10	7	16	9	3	2	1	1	432	296	745	196
South Carolina	11	4	2	3	546	200	72	72	82	30	84	63
Georgia [4]	13	8	3	4	43	26	------	------	35	21	148	------
Florida [4]	21	7	1	3	15	5	2	2	220	73	69	19

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended June 10, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934–38, median	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934–38, median	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934–38, median
E. SO. CEN.												
Kentucky	12	7	14	6	14	8	5	5	31	18	144	147
Tennessee	11	6	3	6	32	18	9	16	79	45	107	94
Alabama [4]	9	5	10	8	95	54	16	15	141	80	121	80
Mississippi [3]	20	8	6	6	------	------	------	------	0	0	------	------
W. SO. CEN.												
Arkansas	5	2	3	3	27	11	9	9	27	11	123	27
Louisiana	27	11	10	11	17	7	12	7	179	74	7	13
Oklahoma	10	5	1	5	56	28	16	21	320	159	117	63
Texas [4]	21	25	16	26	118	143	191	135	362	437	38	241
MOUNTAIN												
Montana [2]	0	0	1	1	37	4	------	2	1,442	154	97	48
Idaho [2]	10	1	0	0	------	------	4	1	235	23	9	10
Wyoming [2]	0	0	0	0	------	------	------	------	1,156	53	19	19
Colorado [2 5]	39	8	18	4	19	4	------	------	698	145	143	143
New Mexico	0	0	8	5	25	2	------	------	136	11	72	49
Arizona	12	1	4	2	528	43	24	10	12	1	3	18
Utah [2 3]	10	1	0	0	40	4	------	------	1,043	105	444	49
PACIFIC												
Washington [2]	12	4	2	0	------	------	------	------	3,247	1,053	47	283
Oregon	5	1	4	1	65	13	14	14	343	69	34	34
California	21	25	31	31	12	15	22	31	1,588	1,936	871	879
Total	11	289	327	414	41	877	442	492	472	11,669	19,890	19,890
23 weeks	17	9,556	11,359	12,123	304	147,990	42,366	101,131	550	312,854	702,121	604,158

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934–38, median	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934–38, median	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	0	0	0	0	0	0	91	15	15	15
New Hampshire	0	0	0	0	0	0	0	0	0	0	1	2
Vermont	0	0	0	0	0	0	0	0	27	2	12	5
Massachusetts	2.4	2	3	2	0	0	0	1	142	121	352	197
Rhode Island	0	0	1	0	0	0	0	0	15	2	8	8
Connecticut	0	0	0	1	0	0	0	0	92	31	87	64
MID. ATL.												
New York [3]	0.4	1	4	7	0.8	2	1	3	114	286	528	616
New Jersey [3]	1.2	1	1	2	0	0	1	0	121	102	97	146
Pennsylvania [3]	4	7	6	6	0.5	1	0	1	130	256	223	496
E. NO. CEN.												
Ohio	0	0	3	3	0	0	1	1	119	155	182	310
Indiana	1.5	1	1	2	0	0	0	0	92	62	34	63
Illinois [3]	0	0	4	5	0.7	1	2	2	132	202	291	415
Michigan [3]	1.1	1	1	2	0	0	1	1	362	342	276	276
Wisconsin	0	0	1	1	0	0	0	0	165	94	99	217
W. NO. CEN.												
Minnesota	0	0	1	1	1.9	1	0	0	83	43	70	70
Iowa [3]	0	0	2	1	0	0	0	0	91	45	56	86
Missouri [2]	0	0	0	2	0	0	0	0	37	29	67	67
North Dakota	0	0	0	0	0	0	0	0	37	5	29	29
South Dakota	0	0	0	0	0	0	0	0	53	7	2	12
Nebraska	0	0	1	0	4	1	0	0	31	8	19	28
Kansas	0	0	1	1	6	2	0	0	81	29	54	54

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended June 10, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934–38, median	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934–38, median	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934–38, median
SO. ATL.												
Delaware [2]	0	0	0	0	0	0	0	0	39	2	6	6
Maryland [2,3]	0	0	0	3	0	0	1	0	49	16	41	41
Dist. of Col.	8	1	0	1	0	0	0	0	49	6	6	7
Virginia [2,4]	0	0	1	7	0	0	1	0	17	9	16	16
West Virginia	0	0	4	3	0	0	0	0	65	24	12	34
North Carolina [4]	0	0	1	2	0	0	0	1	23	16	16	16
South Carolina	2.7	1	1	1	74	27	0	0	8	3	0	0
Georgia [4]	0	0	0	0	1.7	1	0	0	8	5	10	5
Florida [4]	0	0	2	2	9	3	1	0	12	4	3	4
E. SO. CEN.												
Kentucky	1.7	1	4	4	1.7	1	0	0	28	16	20	21
Tennessee	0	0	1	3	0	0	0	0	46	26	10	10
Alabama [4]	4	2	6	4	0	0	2	1	11	6	9	5
Mississippi [3]	0	0	1	1	5	2	4	2	5	2	2	5
W. SO. CEN.												
Arkansas	2.5	1	0	0	0	0	0	0	5	2	4	2
Louisiana	0	0	1	1	2.4	1	3	2	15	6	6	6
Oklahoma	2	1	1	1	0	0	0	0	8	4	20	7
Texas [4]	0.8	1	3	1	3	4	3	3	18	22	41	41
MOUNTAIN												
Montana [2]	0	0	0	0	0	0	0	0	103	11	8	11
Idaho [2]	0	0	0	0	0	0	0	0	0	0	5	6
Wyoming [2]	0	0	0	0	0	0	0	0	0	0	3	24
Colorado [2,5]	5	1	0	0	0	0	0	0	106	22	37	37
New Mexico	25	2	0	0	0	0	0	0	86	7	10	15
Arizona	0	0	0	0	37	3	0	0	282	23	3	7
Utah [2,3]	10	1	0	0	0	0	1	0	139	14	9	15
PACIFIC												
Washington [2]	0	0	0	0	0	0	0	0	80	26	17	44
Oregon	0	0	0	0	0	0	0	0	70	14	19	22
California	0	0	3	3	3	4	1	4	101	123	145	181
Total	1	25	59	88	2.1	54	23	38	89	2,245	2,980	4,011
23 weeks	1.9	1,077	1,749	3,295	1	565	450	506	183	106,053	123,877	149,164

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934–38, median	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934–38, median	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases
NEW ENG.											
Maine	0	0	0	0	18	3	0	2	145	24	29
New Hampshire [2]	0	0	0	0	0	0	0	0	0	0	1
Vermont	0	0	0	0	0	0	1	0	456	34	17
Massachusetts	0	0	0	0	1	1	1	2	171	145	104
Rhode Island	0	0	0	0	0	0	0	0	420	55	26
Connecticut	0	0	0	0	6	2	2	1	300	101	123
MID. ATL.											
New York [3]	1	2	0	0	4	9	7	10	159	398	531
New Jersey [3]	0	0	0	0	1	1	1	3	317	266	197
Pennsylvania [3]	0	0	0	0	4	8	7	8	154	303	232

See footnootes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended June 10, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1954–38, median	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases	1934–38, median	June 10, 1939, rate	June 10, 1939, cases	June 11, 1938, cases
E. NO. CEN.											
Ohio	15	19	1	1	6	8	7	7	87	113	104
Indiana	19	13	25	7	1	1	7	6	104	70	17
Illinois [2]	16	24	15	12	5	8	4	6	163	248	232
Michigan [3]	19	18	1	1	5	5	3	3	230	218	336
Wisconsin	2	1	0	14	0	0	3	3	220	125	197
W. NO. CEN.											
Minnesota	6	3	16	8	0	0	0	0	66	34	28
Iowa [2]	28	14	28	15	2	1	0	0	53	26	37
Missouri [2]	10	8	38	3	9	7	0	7	10	8	19
North Dakota	0	0	19	6	15	2	0	0	131	18	14
South Dakota	75	10	17	3	0	0	1	0	15	2	11
Nebraska	4	1	4	4	8	2	0	1	118	31	14
Kansas	42	15	25	20	3	1	0	2	73	26	131
SO. ATL.											
Delaware [2]	0	0	0	0	0	0	0	0	315	16	3
Maryland [2 3]	0	0	0	0	9	3	2	2	96	31	46
Dist. of Col.	0	0	0	0	0	0	0	0	202	25	7
Virginia [2 4]	0	0	0	0	4	2	8	8	101	54	68
West Virginia	0	0	0	0	8	3	3	4	73	27	76
North Carolina [4]	0	0	2	0	16	11	10	5	346	237	329
South Carolina	0	0	0	0	19	7	6	9	172	63	73
Georgia [4]	10	6	0	0	23	14	22	22	42	25	44
Florida [4]	0	0	0	0	15	5	5	3	45	15	11
E. SO. CEN.											
Kentucky	2	1	4	1	30	17	16	10	28	16	99
Tennessee	56	32	0	0	5	3	18	11	95	54	60
Alabama [4]	0	0	4	1	7	4	4	8	183	104	75
Mississippi [3]	0	0	1	1	3	1	8	7	------	------	------
W. SO. CEN.											
Arkansas	2	1	4	0	30	12	7	3	25	10	39
Louisiana	0	0	0	0	24	10	15	12	97	40	37
Oklahoma	44	22	18	1	18	9	9	4	20	10	78
Texas [4]	2	3	25	11	13	16	38	31	183	221	384
MOUNTAIN											
Montana [2]	19	2	3	3	0	0	0	0	66	7	59
Idaho [2]	10	1	23	1	0	0	0	0	20	2	4
Wyoming [2]	0	0	4	7	0	0	3	0	0	0	3
Colorado [2 5]	43	9	5	4	5	1	4	2	212	44	32
New Mexico	12	1	3	0	0	0	5	4	111	9	6
Arizona	12	1	11	0	25	2	10	3	172	14	17
Utah [2 3]	0	0	0	0	20	2	0	0	675	68	51
PACIFIC											
Washington [2]	3	1	11	4	96	31	4	1	77	25	89
Oregon	20	4	12	3	0	0	0	1	134	27	32
California	13	16	36	8	7	9	15	14	136	166	423
Total	9	228	355	171	9	221	256	256	144	3,555	4,545
23 weeks	14	7,877	11,249	5,026	5	2,941	3,222	3,222	159	90,631	98,803

[1] New York City only.
[2] Rocky Mountain spotted fever, week ended June 10, 1939, 27 cases as follows: New York, 1; New Jersey, 1; Pennsylvania, 4; Illinois, 1; Iowa, 3; Missouri, 1; Delaware, 3; Maryland, 1; Virginia, 4; Montana, 1; Idaho, 1; Wyoming, 3; Colorado, 1; Utah, 1; Washington, 1.
[3] Period ended earlier than Saturday.
[4] Typhus fever, week ended June 10, 1939, 40 cases as follows: Virginia, 1; North Carolina, 2; Georgia, 10; Florida, 7, Alabama, 12; Texas, 8.
[5] Colorado tick fever, week ended June 10, 1939, Colorado, 3 cases.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningitis, meningococcus	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
January 1939										
Wyoming	0	2			88		0	34	4	0
February 1939										
Wyoming	1	2			270		0	28	1	1
April 1939										
Alaska	0	0	60		35		0		0	0
Utah	2	2	198		451		0	95	2	0
May 1939										
Arkansas	5	21	299	274	423	73	3	22	39	12
Connecticut	4	3	11		4,003		0	271	0	6
Delaware	1	3			69		0	22	0	2
Indiana	1	30	55	1	57		0	560	141	11
Maine	0	4	212		614		0	46	0	2
Pennsylvania	34	110			573		0	1,397	0	29
Texas	9	78	1,524	275	1,915	153	4	131	29	46
Vermont	0	0			445		0	31	0	6
West Virginia	4	25	70		18	1	1	93	0	7
Wyoming	2	3			329		0	24	1	1

January 1939

	Cases
Wyoming:	
Chickenpox	55
German measles	7
Mumps	88
Septic sore throat	1
Whooping cough	19

February 1939

Wyoming:	
Chickenpox	35
German measles	2
Mumps	181
Septic sore throat	1
Whooping cough	15

April 1939

Alaska:	
Chickenpox	4
Food poisoning	2
German measles	1
Whooping cough	9
Utah:	
Chickenpox	324
German measles	6
Mumps	895
Rocky Mountain spotted fever	2
Septic sore throat	4
Trachoma	2
Tularaemia	1
Undulant fever	4
Vincent's infection	1
Whooping cough	155

May 1939

	Cases
Actinomycosis:	
Pennsylvania	2
Anthrax:	
Pennsylvania	1
Chickenpox:	
Arkansas	85
Connecticut	292
Delaware	41
Indiana	285
Maine	138
Pennsylvania	3,010
Texas	730
Vermont	88

May 1939—Continued

	Cases
Chickenpox—Continued.	
West Virginia	106
Wyoming	21
Conjunctivitis, infectious:	
Connecticut	22
Dysentery:	
Arkansas (amoebic)	3
Arkansas (bacillary)	12
Texas (amoebic)	4
Texas (bacillary)	175
West Virginia (bacillary)	1
Encephalitis, epidemic or lethargic:	
Arkansas	1
Pennsylvania	4
Texas	5
German measles:	
Arkansas	11
Connecticut	15
Delaware	3
Maine	9
Pennsylvania	69
Vermont	14
Wyoming	6
Hookworm disease:	
Arkansas	5
Leprosy:	
Texas	2
Mumps:	
Arkansas	75
Connecticut	331
Delaware	56
Indiana	361
Maine	84
Pennsylvania	2,152
Texas	221
Vermont	64
West Virginia	68
Wyoming	126
Ophthalmia neonatorum:	
Arkansas	1
Pennsylvania	2
Texas	4
Rabies in animals:	
Arkansas	19
Delaware	2
Indiana	40

May 1939—Continued

	Cases
Rocky Mountain spotted fever:	
Wyoming	13
Septic sore throat:	
Arkansas	36
Connecticut	17
Delaware	3
Indiana	1
Maine	1
Tetanus:	
Arkansas	2
Connecticut	1
Trachoma:	
Arkansas	8
Pennsylvania	2
Trichinosis:	
Arkansas	1
Pennsylvania	2
Tularaemia:	
Arkansas	12
Indiana	2
Texas	4
Wyoming	1
Typhus fever:	
Maine	1
Texas	37
Undulant fever:	
Arkansas	2
Connecticut	4
Indiana	3
Maine	1
Pennsylvania	3
Texas	28
Vermont	4
West Virginia	1
Vincent's infection:	
Maine	1
Vermont	1
Whooping cough:	
Arkansas	100
Connecticut	303
Delaware	60
Indiana	250
Maine	232
Pennsylvania	1,288
Texas	684
Vermont	182
West Virginia	98
Wyoming	4

PLAGUE INFECTION IN GROUND SQUIRRELS IN VENTURA COUNTY, CALIF.

Under date of June 5, 1939, Dr. W. M. Dickie, Director of Public Health of California, reported plague infection proved in six ground squirrels, *C. beecheyi*, submitted to the laboratory on April 25, 1939, from a point 1½ miles north of Rincon, Ventura County.

WEEKLY REPORTS FROM CITIES

City reports for week ended June 3, 1939

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	149	63	28	5,479	512	1,796	16	399	34	1,316	------
Current week [1]	91	63	17	3,729	311	919	32	351	27	991	------
Maine:											
Portland	0	------	1	0	1	1	0	0	0	5	27
New Hampshire:											
Concord	0	------	0	0	0	0	0	0	0	0	7
Manchester	0	------	1	0	2	0	0	0	0	0	13
Nashua	0	------	0	0	0	1	0	0	0	0	4
Vermont:											
Barre	0	------	0	0	0	0	0	0	0	0	1
Burlington	0	------	0	3	0	0	0	0	0	0	7
Rutland	0	------	0	0	0	0	0	0	0	0	3
Massachusetts:											
Boston	1	------	0	191	22	42	0	11	0	16	218
Fall River	1	------	0	0	0	0	0	3	1	0	21
Springfield	0	------	0	15	0	1	0	1	0	2	24
Worcester	0	------	0	42	8	7	0	0	0	24	41
Rhode Island:											
Pawtucket	0	------	0	26	1	0	0	0	0	0	------
Providence	0	------	0	104	1	6	0	1	0	41	59
Connecticut:											
Bridgeport	0	1	0	12	0	1	0	0	0	0	32
Hartford	0	------	0	21	4	1	0	2	1	4	37
New Haven	0	1	0	247	2	3	0	0	0	7	39
New York:											
Buffalo	1	------	0	170	7	25	0	8	0	7	150
New York	19	6	5	225	62	107	0	64	3	65	1,481
Rochester	0	1	0	149	2	10	0	1	0	5	62
Syracuse	0	------	0	217	4	5	0	0	0	23	56
New Jersey:											
Camden	3	------	0	0	1	5	0	1	0	0	20
Newark	0	------	0	0	4	16	0	9	0	49	103
Trenton	0	------	0	1	2	3	0	5	0	2	27
Pennsylvania:											
Philadelphia	4	1	2	73	20	36	0	26	0	88	447
Pittsburgh	3	------	0	1	15	22	0	5	1	25	164
Reading	2	------	0	3	0	0	0	1	0	0	31
Scranton	0	------	------	0	------	0	0	------	0	3	------
Ohio:											
Cincinnati	1	------	0	2	3	15	0	12	0	3	128
Cleveland	1	9	0	2	9	45	0	11	0	39	165
Columbus	4	1	1	4	4	3	0	3	0	1	76
Toledo	0	------	0	39	3	7	2	6	0	36	72
Indiana:											
Anderson	1	------	0	0	0	1	5	0	0	4	10
Fort Wayne	0	------	0	0	3	9	3	3	0	0	35
Indianapolis	1	------	0	1	4	15	2	5	1	43	88
South Bend	0	------	0	2	1	1	0	0	0	18	15
Terre Haute	0	------	0	1	0	1	1	0	0	0	10
Illinois:											
Alton	0	------	0	0	0	0	0	0	0	0	14
Chicago	5	------	0	20	17	161	1	47	1	103	623
Elgin	0	------	0	0	0	0	1	0	0	2	17
Moline	0	------	0	0	0	1	0	0	0	1	7
Springfield	0	------	0	0	1	0	0	0	2	4	31

[1] Figures for Savannah, Little Rock, and Boise estimated; reports not received.

City reports for week ended June 3, 1939

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Death all causes
		Cases	Deaths								
Michigan:											
Detroit	5	1	0	45	10	98	0	19	1	74	245
Flint	2	------	0	33	0	23	0	0	1	6	27
Grand Rapids	0	------	1	1	2	22	0	0	0	1	30
Wisconsin:											
Kenosha	0	------	0	1	1	6	0	0	0	4	11
Madison	0	------	0	134	0	1	0	0	0	7	14
Milwaukee	0	------	0	5	2	36	0	6	1	32	109
Racine	0	------	0	3	0	6	0	0	0	6	9
Superior	0	------	0	8	0	1	0	0	0	0	14
Minnesota:											
Duluth	0	------	0	1	1	0	0	0	0	0	23
Minneapolis	0	------	0	64	3	15	10	2	0	21	98
St. Paul	0	------	0	64	3	9	0	1	0	18	58
Iowa:											
Cedar Rapids	0	------	------	5	------	1	0	------	0	2	------
Davenport	2	------	------	0	------	2	2	------	0	2	------
Des Moines	0	------	0	1	0	9	8	0	0	0	34
Sioux City	1	------	------	6	------	1	0	------	0	1	------
Waterloo	0	------	------	2	------	4	0	------	0	0	------
Missouri:											
Kansas City	1	------	0	1	5	13	4	4	0	0	83
St. Joseph	0	------	0	0	1	1	0	0	0	2	20
St. Louis	1	1	0	0	4	20	0	3	1	6	208
North Dakota:											
Fargo	0	------	0	1	1	0	0	1	1	0	8
Grand Forks	0	------	------	0	------	0	0	------	0	0	------
Minot	0	------	0	0	0	0	0	0	0	0	7
South Dakota:											
Aberdeen	0	------	------	37	------	0	3	------	0	0	------
Sioux Falls	0	------	------	------	------	5	0	------	0	0	------
Nebraska:											
Lincoln	1	------	------	38	------	1	0	------	0	9	------
Omaha	0	------	0	4	3	0	2	0	0	0	48
Kansas:											
Lawrence	0	------	0	1	0	0	0	0	0	0	3
Topeka	0	------	0	2	1	2	8	1	0	1	14
Wichita	0	------	0	9	1	2	0	1	0	3	29
Delaware:											
Wilmington	0	------	0	7	1	0	0	1	0	2	30
Maryland:											
Baltimore	1	4	0	77	10	7	0	8	0	28	235
Cumberland	0	------	0	0	0	0	0	0	0	0	17
Frederick	0	------	0	0	0	0	0	0	0	0	2
Dist. of Col.:											
Washington	4	------	0	334	5	7	0	4	1	27	124
Virginia:											
Lynchburg	0	------	0	77	1	1	0	0	1	28	9
Norfolk	0	1	0	21	3	2	0	0	0	8	31
Richmond	0	------	0	208	0	3	0	2	0	1	33
Roanoke	1	------	0	0	0	1	0	0	1	0	11
West Virginia:											
Charleston	0	------	0	0	3	0	0	1	0	0	9
Huntington	0	------	------	0	------	0	0	------	0	0	------
Wheeling	2	------	0	1	0	5	0	0	0	14	34
North Carolina:											
Gastonia	0	------	------	0	------	0	0	------	0	0	------
Raleigh	0	------	0	0	0	0	0	1	0	2	9
Wilmington	0	------	0	0	0	0	0	0	0	0	8
Winston-Salem	0	------	0	0	0	0	0	2	0	0	24
South Carolina:											
Charleston	1	5	0	0	0	2	0	0	0	6	17
Florence	0	------	0	0	0	0	0	0	0	0	16
Greenville	0	------	0	0	3	0	0	0	0	0	7
Georgia:											
Atlanta	4	10	2	2	1	3	0	4	0	6	76
Brunswick	0	------	0	12	0	0	0	0	0	5	3
Savannah	------	------	------	------	------	------	------	------	------	------	------
Florida:											
Miami	1	------	0	1	1	1	0	4	0	1	49
Tampa	1	------	0	38	3	2	0	0	0	0	20
Kentucky:											
Ashland	0	------	0	0	1	0	0	0	0	0	7
Covington	0	------	0	1	3	2	0	3	0	0	19
Lexington	0	------	0	0	0	1	0	2	0	0	21
Louisville	0	------	0	2	1	3	0	0	0	5	83

City reports for week ended June 3, 1939

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Tennessee:											
Knoxville	0	------	0	0	2	0	0	1	0	2	30
Memphis	0	------	0	3	0	4	0	2	0	19	80
Nashville	0	------	1	1	0	10	0	2	1	0	39
Alabama:											
Birmingham	1	1	0	0	2	1	0	5	1	5	54
Mobile	0	------	1	1	2	0	0	2	0	0	29
Montgomery	0	------	------	1	------	0	0	------	0	1	------
Arkansas:											
Fort Smith	0	------	------	8	------	0	0	------	1	0	------
Little Rock	------	------	------	------	------	------	------	------	------	------	------
Louisiana:											
Lake Charles	0	------	0	0	2	0	0	0	0	0	4
New Orleans	5	1	0	31	3	0	0	9	2	0	120
Shreveport	1	------	0	4	1	0	0	4	0	0	29
Oklahoma:											
Oklahoma City	0	4	0	0	2	1	2	2	0	0	33
Tulsa	0	------	------	21	------	3	0	------	0	0	------
Texas:											
Dallas	3	------	0	17	0	2	0	4	0	0	44
Fort Worth	0	------	0	12	1	1	0	2	0	0	33
Galveston	0	------	0	0	1	0	0	0	0	1	14
Houston	2	------	0	17	2	1	0	6	1	5	89
San Antonio	0	------	0	0	3	1	0	4	0	1	85
Montana:											
Billings	0	------	0	0	0	0	0	0	0	0	5
Great Falls	0	------	0	66	0	1	0	0	0	0	4
Helena	0	------	0	4	0	0	0	0	0	0	2
Missoula	0	------	0	0	0	1	0	0	0	0	4
Idaho:											
Boise	------	------	------	------	------	------	------	------	------	------	------
Colorado:											
Colorado Springs	0	------	0	4	0	5	1	1	0	2	16
Denver	4	------	0	27	5	7	0	7	0	24	89
Pueblo	0	------	0	41	0	4	1	0	0	7	5
New Mexico:											
Albuquerque	0	------	0	0	0	0	0	1	0	0	6
Utah:											
Salt Lake City	0	------	0	6	1	8	0	2	3	15	34
Washington:											
Seattle	0	------	0	511	1	4	0	1	0	6	86
Spokane	0	------	0	93	0	4	0	1	0	0	29
Tacoma	1	------	0	10	2	2	0	0	0	0	21
Oregon:											
Portland	0	------	0	1	1	5	0	2	0	2	69
Salem	0	------	------	2	------	1	0	------	0	0	------
California:											
Los Angeles	4	6	3	298	16	33	0	16	1	20	311
Sacramento	0	------	0	75	2	2	0	2	0	0	22
San Francisco	1	2	0	14	5	8	0	4	0	13	146

State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	2	1	0
Worcester	1	1	0
New York:			
New York	3	0	2
Pennsylvania:			
Philadelphia	0	0	1
Pittsburgh	2	1	1
Illinois:			
Chicago	2	1	1
Michigan:			
Detroit	1	0	0
Kansas:			
Topeka	1	1	0
North Carolina:			
Raleigh	0	0	1
South Carolina:			
Charleston	0	0	10
Texas:			
Houston	1	0	0
California:			
Los Angeles	1	0	0
San Francisco	1	0	0

Encephalitis, epidemic or lethargic.—Cases: St. Paul, 1.
Pellagra.—Cases: Chicago, 1; Charleston, S. C., 1; Miami, 1; New Orleans, 1.
Typhus fever.—Cases: Mobile, 1; Montgomery, 1; San Antonio, 1; Los Angeles, 1.

FOREIGN AND INSULAR

BERMUDA

Vital statistics—1938.—Following are vital statistics for Bermuda for the year 1938:

Estimated population, Dec. 31, 1938	31,388	Deaths per 1,000 population	11.4
Number of marriages	226	Deaths under 1 year of age	46
Total births	799	Deaths under 1 year of age per 1,000 live births	59
Births per 1,000 population	25.5		
Number of deaths (including stillbirths)	360		

CANADA

Provinces—Communicable diseases—Week ended May 20, 1939.—During the week ended May 20, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					4				1	5
Chickenpox		9	41	8	115	12	14	6	48	253
Diphtheria				17		9	1	2		29
Influenza		19			27	2	5		69	122
Measles		21		1,122	760	8		6	6	1,923
Mumps				37	82	40	1	1	8	169
Pneumonia		9			42		2		6	59
Poliomyelitis				1			1			2
Scarlet fever	1	7	15	40	104	8	15	12	12	214
Trachoma							5			5
Tuberculosis		26	16	69	60	5	2	5		183
Typhoid and paratyphoid fever	1	2	1	5		1				10
Whooping cough		16	5	101	123	16	21	10	68	360

CUBA

Habana—Communicable diseases—4 weeks ended May 6, 1939.—During the 4 weeks ended May 6, 1939, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	18		Tuberculosis	8	1
Malaria	5	1	Typhoid fever	37	4
Scarlet fever	3				

Provinces—Notifiable diseases—4 weeks ended April 29, 1939.—During the 4 weeks ended April 29, 1939, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	2	1	2	3		6	14
Cerebrospinal meningitis				1			1
Chickenpox				3	1	1	5
Diphtheria	1	23		6	2		32
Leprosy	2	1		1		6	10
Malaria	24	24	2	8	3	20	81
Measles		1		5		8	14
Scarlet fever		1					1
Trachoma		5	3				8
Tuberculosis	37	54	33	36	24	54	238
Typhoid fever	14	69	8	41	5	17	154
Whooping cough		6		3			9
Yaws						1	1

FINLAND

Communicable diseases—April 1939.—During the month of April 1939, cases of certain communicable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Diphtheria	193	Scarlet fever	579
Influenza	6,821	Typhoid fever	12
Paratyphoid fever	22	Undulant fever	1
Poliomyelitis	4		

LATVIA

Notifiable diseases—January–March 1939.—During the months of January, February, and March 1939, cases of certain notifiable diseases were reported in Latvia as follows:

Disease	January	February	March	Disease	January	February	March
Botulism		7		Paratyphoid fever	15	10	4
Cerebrospinal meningitis	5	5	16	Poliomyelitis	16	9	5
Diphtheria	226	160	177	Puerperal septicemia	14	11	2
Erysipelas	36	39	49	Scarlet fever	406	383	353
Influenza	111	947	1,851	Tetanus		2	
Lead poisoning	14	3	5	Trachoma	68	74	76
Leprosy	1			Tuberculosis	294	272	324
Lethargic encephalitis			1	Typhoid fever	91	133	81
Measles	191	1,000	2,629	Typhus fever	2		
Mumps	616	925	1,075	Whooping cough	50	42	82

SCOTLAND

Vital statistics—First quarter 1939.—Following are vital statistics for Scotland for the quarter ended March 31, 1939:

Disease	Number	Rate per 1,000 population	Disease	Number	Rate per 1,000 population
Population	5,010,500		Deaths from—Continued.		
Marriages	7,658	6.2	Influenza	709	
Births	21,429	17.3	Lethargic encephalitis	31	
Deaths	18,995	15.4	Measles	2	
Deaths under 1 year of age	1,890	[1] 88	Nephritis, acute and chronic	392	
Deaths from:					
Appendicitis	99		Pneumonia (all forms)	1,244	1.01
Cancer	2,023	1.64	Poliomyelitis	5	
Cerebral hemorrhage	1,185		Puerperal sepsis	28	
Cerebrospinal fever	27		Scarlet fever	18	
Cirrhosis of the liver	57		Senility	771	
Diabetes mellitus	246		Suicide	118	
Diarrhea and enteritis (under 2 years)	154		Syphilis	22	
			Tetanus	3	
Diphtheria	110		Tuberculosis (all forms)	995	.81
Dysentery	9		Typhoid fever	6	
Heart disease	4,280		Whooping cough	218	

[1] Per 1,000 live births.

SWEDEN

Notifiable diseases—April 1939.—During the month of April 1939, cases of certain notifiable diseases were reported in Sweden as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	4	Poliomyelitis	7
Diphtheria	7	Scarlet fever	4,020
Dysentery	1	Syphilis	27
Epidemic encephalitis	1	Typhoid fever	10
Gonorrhea	890	Undulant fever	9
Paratyphoid fever	46	Weil's disease	1

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for May 26, 1939, pages 906-918. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Cholera

China—Shanghai.—During the week ended June 10, 1939, 1 case of cholera was reported in Shanghai, China.

India—Akyab.—For the week ended June 3, 1939, 1 fatal case of cholera was reported in Akyab, India.

India (French)—Pondichery Territory.—During the week ended April 15, 1939, 1 fatal case of cholera was reported in Pondichery Territory, French India.

Plague

Brazil.—During the month of February 1939, 5 cases of plague were reported in Alagoas State, and 3 cases of plague with 2 deaths were reported in Pernambuco State, Brazil.

United States—California—Ventura County.—A report of plague infection in Ventura County, California, appears on page 1125 of this issue of Public Health Reports.

Smallpox

Mexico.—During the month of March 1939, smallpox was reported in Mexico as follows: Aguascalientes, Aguascalientes State, 3 cases, 3 deaths; Guaymas, Sonora State, 1 case; Mexico, D. F., 9 cases; Monterrey, Nuevo Leon State, 3 cases, 1 death; Pachuca, Hidalgo State, 7 cases, 1 death; San Luis Potosi, San Luis Potosi State, 11 cases, 3 deaths; Tampico, Tamaulipas State, 15 cases, 2 deaths.

Typhus Fever

Mexico.—During the month of March 1939, typhus fever was reported in Mexico as follows: Aguascalientes, Aguascalientes State, 2 cases, 1 death; Mexico, D. F., 9 cases, 3 deaths; Pachuca, Hidalgo State, 1 case; San Luis Potosi, San Luis Potosi State, 3 cases.

Yellow Fever

Gold Coast—Keta.—On June 2, 1939, 1 case of yellow fever was reported in Keta, Gold Coast.

Ivory Coast.—Yellow fever has been reported in Ivory Coast as follows: Arra—May 31, 1939, 1 case, June 4, 4 cases; Dimbokro—May 31, 1 case.